

observations of Waves Generated by the Pickup of Interstellar Hydrogen ions

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For many years, theorists have speculated about the effects of interstellar hydrogen flowing through the heliosphere and becoming ionized. The distribution function of such freshly-created ions is highly anisotropic and, as a consequence, unstable growth of hydromagnetic waves is expected. Among the collisionless processes that might result are the slowing down and heating of the bulk solar wind and the stochastic acceleration of the ions which might then serve as seed particles for the anomalous cosmic ray component. Wave generation has been investigated by C. Wu, M. Lee, P. Isenberg and many other theorists, who have also studied the analogous pickup of cometary ions. Experimentalists have attempted to detect the waves generated by interstellar ions, in particular, using the Pioneer 11 and Voyager 1,2 magnetic field data, but their efforts have previously proven unsuccessful. Recent detection of interstellar hydrogen ions near 5 AU by the Ulysses Solar Wind Ion composition Spectrometer (J. Geiss, G. Gloeckler, et al) has stimulated a search for the accompanying waves in the magnetic field measurements (Balogh, Smith, Southwood, and Tsurutani). This attempt appears, at last, to have proven successful. Waves at and above the local H^+ gyro frequency have been observed on several occasions when the background magnetic field tended to be radial. These observations will be presented and compared with theory.

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